New Cell Structure
in Lithium ion Polymer Battery

Hyang-Mok Lee, Je-Young Kim, Byung-Jin Choi, Jae-Hyun Lee, Hee-Gyung Kang, Mi-Young Son
Seung-Jin Lee and Soonho Ahn
Battery Research Institute, LG Chemical Ltd.,
P.O. Box 61, Yusong, Science Town, Taejon, 305-380, Korea

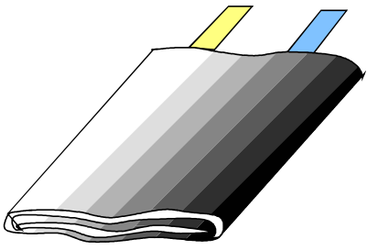
The lithium ion polymer battery (LiPB) system, which may be considered as a betterment of lithium ion cells, has grown rapidly in various applications such as the portable power industry. It is based on the fact that LiPB has the advantages of “Thinness, Lightness, More-balanced Safety and Lower Cost” over the winding and hard packaging cells in lithium ion system, while still showing the best characteristics of electrical performance. Up to now, most development of LiPB has been focused on consisting materials –active materials and gel polymer electrolytes- inside the cells. Recently, there have been increasing interest and many attempts in more optimized cell structure to increase loading level of active materials, to stretch cell performance and to make better dimensional stability during the charge-discharge cycling.

It is very hard and important to state what are the relations between the cell structural parameters and electrical cell performances. One of the important factors related to them is a pressure applied to the inside cell structure particularly in the LiPB system using the soft packaging materials. In this work, we analyzed effects of the pressure on performance characteristics of stack-type cells in terms of interfacial resistance, energy density, cycle life etc. We have previously developed and demonstrated novel cell structure (Fig.1-a), a stacked flat plate structure combined with winding technology, which can produce self-generated stack pressure spontaneously. It gives high energy density and high performance when compared to traditional cell stacks (Fig.1-b) by Bellcore technology.

On the other hand, the stacked cell is quite different from round or flattened jellyroll structure (Fig.1-c) often used for lithium ion or LiPB. It is found that a peculiar distortion in jellyroll-type cell is favored during the cycling, because of presence of curvature. We compared and identified the external dimensional stability between stacks and round type cells by investigating the cell thickness and shape change.

a. Integrated and monolithic structure

b. Plain cell stacks



c. Jellyroll type structure

Fig. 1 Various cell structures for LiPB